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OCT 1959

FAO PLANT PROTECTION BULLETIN

is issued as a medium for the dissemination of information received by the World Reporting Service on Plant Diseases and Pests, established in accordance with the provisions of the International Plant Protection Convention, 1951. It publishes reports on the occurrence, outbreak and control of pests and diseases of plants and plant products of economic significance and related topics, with special reference to current information. No responsibility is assumed by FAO for opinions and viewpoints expressed in the Bulletin.

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TABULATED INFORMATION ON TROPICAL AND SUBTROPICAL GRAIN LEGUMES

Increasing appreciation of the importance of grain legumes or pulse crops for the improvement of human nutrition – particularly in tropical and subtropical countries, where diets are generally deficient in protein, fats and oils – has resulted in a need to promote and co-ordinate research and exchange of information on the subject.

The above 367-page publication gives a detailed listing of species and varieties of grain legumes grown in tropical and subtropical regions, where most of the underdeveloped areas with major problems of human nutrition occur. If necessary, of course, the project could be extended to cover grain legumes in temperate zones as well.

The information contained in the present volume covers twelve standard headings for each of the countries listed: identification, station submitting the information, source of crop, genetic origin, uses, seed availability, major insect pests, major diseases, morphology and habit, culture, resistances, and yield and quality.

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FAO PLANT PROTECTION BULLETIN

A PUBLICATION OF THE WORLD REPORTING SERVICE ON PLANT DISEASES AND PESTS

Control of Weaver Bird in West Africa

A. Mallamaire, Service de la protection des végétaux, Dakar, Sénégal

Grain-eating birds, which cause serious losses to cereal crops, particularly millets, sorghum and rice, have always been considered in the Saharan part of Africa to be as destructive as locusts. From the Peninsula of Cap Vert to the shores of the Red Sea and from Fort-Lamy to Pretoria, these birds are very destructive to the harvests; the most damaging of the species belong to the genus *Quelea* of the family Ploceidaea.

Quelea quelea, or weaver bird, is represented in tropical, Central and South Africa by the following four geographic races:

1. *Quelea quelea quelea* L. is the most widespread of the genus in the Saharan and Sudano-Saharan regions of West Africa. It is found from Senegal to Lake Chad and often far beyond this area.
2. *Quelea quelea aethiopica* Sundeval is a mountain race prevalent in the Ethiopian Mountain Massif and in East Africa (Kenya and Tanganyika), as well as in the Republic of the Sudan.
3. *Quelea quelea centralis* Van Someren is widespread from Lake Albert to Uganda, in Ruanda, around Lake Tanganyika, and possibly in the Lake Mweru area.
4. *Quelea quelea lathami* Smith causes severe losses in Southern Rhodesia, South Africa (Transvaal, Orange Free State, Natal, Bechuanaland, Swaziland, Southwest Africa) and Mozambique.

In addition to the above, Chapin[1] reported two other species from the Belgian Congo, namely *Quelea erythops* Hartlaub which is prevalent in tropical forests, and *Quelea cardinalis* Hartlaub in the savanna area.

Among other bird pests in West Africa the following species may be mentioned: *Plesiositraga cucullata* P. L. S. Müller, *Euplectes afra* Gmelin, *Passer griseus griseus* Vieillot, and *Passer* (*Auri-passer*) *luteus* Lichtenstein. Other migratory birds are apt to cause serious damage, especially in rice fields. These include species of the family Anatidae (geese, ducks, teals and garganeys) and Scolopacidae (godwits, sandpipers and ruffs).

It was estimated that there are billions of these birds and, in the Senegal Valley alone, hundreds of millions of them consume or destroy from 100,000 to 200,000 tons of cultivated grain annually. The bird presents a particularly serious problem, since large areas have been planted to cereals, these enlarged areas providing a favorable feeding ground for the birds.

Biology of Quelea

Quelea quelea quelea is a small bird weighing 18 to 19 grams. It is speckled black, gray-brown on the back and upper part of the wings, and

[1] CHAPIN, J. P. 1955. "The three species of *Quelea* in the Belgian Congo." Paper presented at the CCTA/CSA Specialist Meeting on the *Quelea*, 31 October–6 November 1955.

grayish chamois color on the abdomen, sometimes slightly pink on the male. During the mating season a marked sexual dimorphism differentiates male from female. Toward June, the male develops its breeding plumage, consisting of a black mask and a more or less dark bill. Otherwise it is a grayish chamois color like the female. The bill of the female is always of a lighter color than that of the male.

In West Africa the habitat of the *Quelea* is in a region with rainfall ranging between 300 and 600 millimeters. It occurs from Senegal to Lake Chad and its northernmost nesting areas are located at 17° latitude north, on a level with Lake Rkiz in Mauritania and Timbuktu in the Sudan.

Breeding takes place in September and early October. The male develops its breeding plumage in the first days of August, while the female is still in the resting stage. Breeding, which is preceeded by a concentration of birds, is closely linked to rainfall, which is favorable to the growth of grasses which the birds use to build their nests. The nest (Figure 1), which is in the shape of a bag, is of rather rough texture and is woven with the haulm of small grasses (*Panicum*, *Setaria*, *Aristida*, *Cenchrus*, etc.) without inner lining. At its upper end it is firmly attached to branches, with an oval opening usually located in the upper part of the nest. These are built on thorny trees and completely cover them. The main tree species are *Balanites*, *Ziziphus*, *Capparis* and *Acacia* spp. (Figure 2).

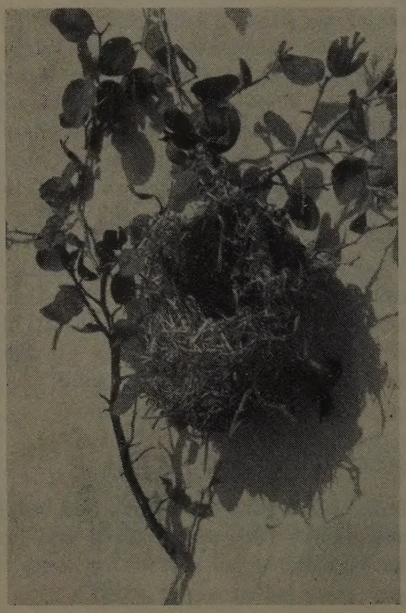

Figure 1. A nest of the weaver bird (*Quelea quelea quelea*).

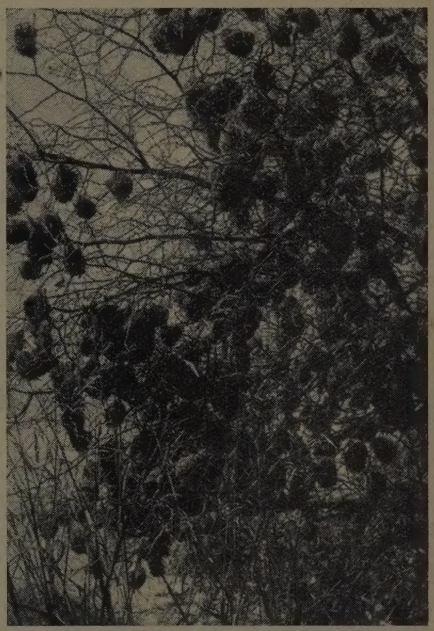

Figure 2. A tree in the nesting site of the weaver bird (*Quelea quelea quelea*) in Mauritania, with 2,000 to 3,000 nests.

A nesting site may extend continuously over 20 to 50 hectares. These are easily detected, since the trees are entirely covered by the straw of the nests and the birds cause a deafening uproar. The density of nests varies from 300 to 2,000 per tree, according to the size of the tree.

Nesting sites are generally located near a water source and often on the border of a flood area. In Senegal and Mauritania, during the heavy floods of 1958, it was observed that the birds nested directly in the flood, thus making control operations almost impossible.

Each nest has an average of two to five eggs of a light bluish-green color. Some of the eggs are at times not fertilized because of late laying or because of disturbances at the time of laying. It is therefore estimated that an average of two and a half young are produced per nest.

The period of development of this species is short. An average of 30 days is required for locating the nesting site, building the nest, incubating the eggs, and rearing the fledglings. After the initial flight trials, the young birds leave their parents (Figure 3) and the population of the nesting area disperses in flocks of about 100 birds. The latter leave for the bush in search of food, which consists essentially of grains of small grasses and especially *paguiri* grain (*Panicum laetum*), which is the basic noncultivated food of *Quelea*.

At certain periods, the birds eat insects and winged termites; insects of Orthoptera, Coleoptera, Hemiptera and Diptera have been found in the stomach of adults and fledglings. It seems that during certain periods, particularly at the beginning of the rainy season, this food is necessary to attain sexual maturity.

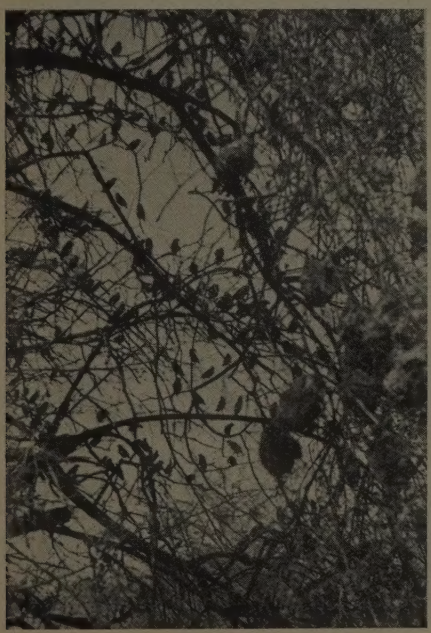

Figure 3. Young weaver birds leaving their nests.

When birds are in the vicinity of cultivated sorghum or rice fields, they descend upon them in large numbers and literally pillage the crop. Attacked rice fields are devastated as much by the birds shattering the grain as by feeding. Often the attacks begin at the flowering stage. The birds pinch the milk-stage grains with their bills and empty them. On sorghums and millets the attack is a progressive destruction of the panicles and heads. Both early and late rice varieties are damaged, and in the Senegal Valley, farmers have discontinued growing certain sorghum and millet varieties because of continuous losses caused by *Quelea*.

Quelea are mediocre flyers and move generally in grouped short flights. Flocks of several million birds roosting on various thorny trees take off at sunrise and go to feed in fields of wild grasses or in harvested rice fields, where they collect the grain left on the ground. When the food supply of one region is exhausted, they migrate to neighboring areas, thus covering considerable distances. Little is known in West Africa regarding their migratory habits, since bird-banding is of recent date. But in South Africa it has been observed that banded *Quelea quelea lathami* may migrate 900 kilometers or farther.

Control methods

Over the centuries the African farmer has been trying to control *Quelea*. Fields are protected by having children rattle gourds or tins, or shouting at intervals. Very often the cereal heads are bound up in rolled leaves or old rags to avoid injury. Only about ten years ago villagers still gathered day and night during three to four days to perform battue, in order to keep the birds from resting and sleeping. The birds would eventually leave the place and move to quieter sites. To prevent nesting, farmers used to fell trees with nests and burn them. All these methods were not particularly efficient and there is no doubt that the present change in the political structure of West Africa, as well as the expansion of the cultivated area, will result in the adoption of more efficient methods of control.

Since 1951, after a preliminary study of the biology of *Quelea*, carried out by P. L. Dekeyser

of the Institut français d'Afrique noire at the request of the Plant Protection Service in Dakar, various control methods have been tested. At first, acoustic methods with ordinary guns and swivel guns were used. It was possible to kill 100 kilograms of *Quelea* a day with 15 guns, i. e., about 5,000 birds. Although this result might seem spectacular, it was insignificant, considering the large population of the birds.

Subsequently, acetylene explosions proved more successful and were particularly effective on large, rather timorous birds, such as ducks, teals, godwits, sandpipers and ruffs. For control of *Quelea*, this method was soon abandoned, since the equipment is expensive, fragile, and requires constant maintenance and repair. Moreover, one detonation per hectare is needed to disperse the birds, which rise only a few meters after the blast and settle down a little further, causing additional damage.

Sirens producing modulated sounds such as alarm sirens, were a complete failure. The birds became accustomed to the noise and even roosted on the sirens.

At Richard-Toll, low-flying airplanes were used over the fields to frighten the birds away. The flocks dispersed when the planes came over but settled down a few hundred meters distant. This expensive and inefficient method was also abandoned.

Considering that these control measures proved ineffective, it was soon recognized that *Quelea* control had to be organized on a sounder basis, with a view to reducing bird populations by attacking *Quelea* when they are most vulnerable and control is relatively inexpensive. In 1954, a special bird control organization was established to undertake the destruction of birds in roosts and to eliminate nesting sites. Simultaneously, laboratory investigations were initiated to develop new control methods.

Destruction of roosts. After a number of field tests, it was concluded that killing birds in the roosts by explosives was practical. Safety explosives, such as Berclavite, supernitratite and plastic nitratite with 40 percent aluminium, can be used in charges of 5 to 10 kilograms. They are placed at two thirds the height of the trees, are connected with electric wires and a generating set, and are fired by a 50-cycle alternating current.

The use of explosives on roosts is economical in dense forests. When trees are spaced widely, the installation of the firing equipment is difficult and the effect of the explosion is reduced. If roosting sites are marshes overgrown with reeds and *Typha*, the effect of the explosion is largely absorbed by the water and the mass of vegetation, and roosts are difficult to reach. To improve the efficiency of this method, bottles or tins filled with petrol may be added to the charge but this constitutes a fire hazard.

Destruction of nesting sites. After having tried to clear the ground with bulldozers to destroy the trees with nests, it was soon realized that this method could not be put into general practice in a country where trees are too valuable. Explosives and flame throwers were tested with unsatisfactory results; the latter is too cumbersome to use, has too many limitations, and causes extensive injury to vegetation. Subsequently, the sprayers used were equipped with special nozzles. They produce 6 to 7-meter-long flames when used on knapsack sprayers, and 8 to 12-meter-long flames on power sprayers. With this equipment, nests can be burned without excessive damage to vegetation. Teams of workmen may be supplied with one of the following three types of sprayers:

1. Hand sprayer of "Colibri" type, with a 19-liter capacity, developing a pressure of 10 kilograms per square centimeter.
2. Light power sprayer mounted on a Land Rover, with a 200 to 300-liter capacity, and a 40-kilogram pressure per square centimeter, with one nozzle working.
3. Power sprayer of the "Titan" type, mounted on a cross-country truck, with a 1,600-liter capacity, and a pressure of 40 kilograms per square centimeter, with two nozzles in operation.

It should be noted that when nests are burned, the fire does not reach them instantaneously, and although all the fledglings are killed, parent birds generally have time to escape. It is estimated that only 10 percent of the parents are killed and sometimes additional egg-laying takes place.

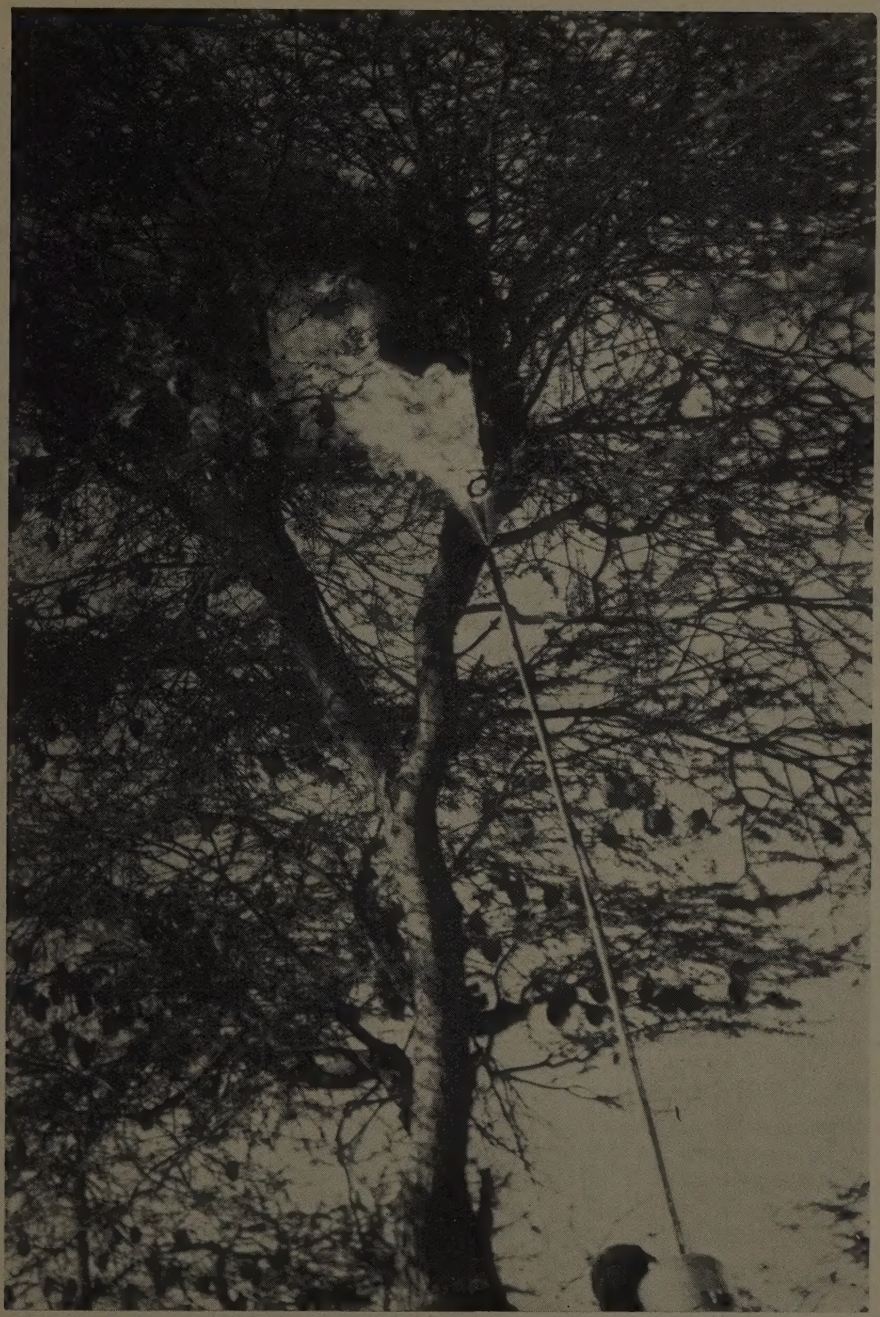

Figure 4. Burning nests of the weaver bird on an *Acacia* tree with a flame thrower.

CHEMICAL CONTROL. In laboratory tests carried out during the past several years, a number of toxic compounds such as chloropicrin, sulphur dioxide, phosgene, hydrocyanic acid, anticoagulants and glucochloral have been tested for the destruction of *Quelea* in roosts or nesting sites. Among those which were promising were parathion, phosdrin and dinitro-orthocresol.

Parathion was tested in West and South Africa and gave excellent results. In the latter country, it has come into general use, and is applied to nesting sites at a concentration of 25 and 50 percent, at the rate of 22.5 to 45 liters per hectare, with resulting mortality between 50 and 98 percent, depending on the origin of the product. The application is made at night by light airplanes (Super Cub) flying at 80 miles per hour a few meters above the top of the bushes. Searchlights and ground-to-air radio communication furnish adequate guidance of the movements of the plane. Treatments begin at nightfall when the birds are asleep. Differences in results have been observed when the same concentrations of the product were used. This is due to variations in quality of parathion and in the types of solvents and of emulsifiers furnished by different manufacturers. It is recommended, therefore, that several products be tested, and only those giving highest mortality be used.

Phosdrin, the alpha isomer of 2 carbometoxy-l-methylvinyl dimethyl phosphate, has come into use only recently. It is also a phosphorus ester which is as toxic to human beings and other mammals as parathion but has the advantage of losing its toxicity rapidly by decomposition. At the request of the Plant Protection Service, tests were made at the ornithology laboratory of Richard-Toll by G. Morel and A. Serrurier. The results, given in Table 1, are indicative of the fact that phosdrin at 25 percent concentration kills birds much quicker than preparations of lower concentrations or parathion.

The 25 percent preparation of phosdrin, used at the rate of 2 grams per square meter, or 20 kilograms per hectare, resulted in mortality of 87.5 percent after 15 minutes and 100 percent after 25 minutes. It appears then that phosdrin will be used generally for *Quelea* control, since its application does not require prolonged supervision of the treated sites, as is the case with parathion.

Dinitro-orthocresol, composed chiefly of 2-4 dinitro-6-methylphenol with a certain proportion of para and meta derivates, gave promising results. It has herbicidal and insecticidal properties and is also toxic to humans and mammals. A 20-percent dust, discharged at the rate of 50 grams per minute, gives 100 percent mortality after 15 minutes. Since inhaling this dust causes rapid pulmonary congestion, it may harm the operators and is therefore not recommended for use on roosts or nesting sites. The results given

TABLE 1. Effects of parathion and phosdrin on mortality of *Quelea*, Richard-Toll, 12 February 1959[a]

Chemical and concentration used at rate of 4 grams per square meter	Mortality, in percent, after:					
	15 min.	2 hrs.	3 hrs.	5 hrs.	15 hrs.	23 hrs.
Parathion 25 percent	0	37.5	37.5	75	87.5	100
» 10 »	0	25	75	75	87.5	100
» 5 »	0	0	0	0	0	0
Phosdrin 25 »	100	—	—	—	—	—
» 10 »	0	0	12.5	12.5	12.5	12.5
» 5 »	0	0	0	0	0	0

[a] Temperature: 35° C.; humidity: 25 percent; wind: very weak.

in Table 2 were obtained with a 10-percent oil solution.

TABLE 2. Effect of a 10 percent oil solution of dinitro-orthocresol on mortality of *Quelea*, Richard-Toll, 28 January 1959[a]

Rate of application in grams per square meter	Mortality in percent after 11 hours		
	day	night	difference
10	50.0	37.5	12.5
20	87.5	62.5	25.0
30	100.0	87.5	12.5

[a]Temperature: 34° C. (day), 28° C. (night); humidity: 25 percent (day), 40 percent (night); wind: nil (day), light (night).

In Tanganyika, caged birds treated with a 20 percent solution of dinitro-orthocresol at the approximate rate of 45 liters per hectare during the afternoon were all killed, whereas in roosts treated during the night with the same product at the approximate rate of 90 liters per hectare, the mortality reached only 25 to 30 percent. High temperatures are known to increase the effectiveness of this product.

It is unlikely that dinitro-orthocresol will come into general use, as the quantity that must be applied, about 300 kilograms of a 10 percent solution per hectare, is too high. The herbicidal properties of this product should be taken into account, as they would permit the simultaneous destruction of *Quelea* and of reeds or cattails.

Research in progress

In addition to the above, biological control methods have also been investigated, in order to discover if they could lead to massive destruction of *Quelea* in a manner similar to the utilization of myxomatosis for the control of rabbits. With this object in mind, fowl pest virus, salmonellosis, caused by *Salmonella typhimurium*, pullorum disease, caused by *S. pullorum*, and a virus disease of Newcastle type have been under investigation by specialists in the veterinary services of Alfort and Saint Louis. Up to the present these studies have not led to the development of appropriate control methods.

Investigations have also been carried out at the National Agricultural Research Institute of Jouy-en-Josas for the purpose of finding some acoustical method either to frighten the birds away or to attract them, in order to facilitate their destruction. The results of these investigations are promising but still need further study.

Organization of Quelea *control*

By General Decree of 24 July 1953, the infestations of crops by weaver bird (*Quelea quelea quelea*) were proclaimed a public calamity in the entire territory of French West Africa and the decree provides that public officials shall use all resources and means at their disposal to control these birds and protect the crops.

The Decree of 12 July 1955 provides for the creation of a joint control body for Senegal and Mauritania. This body, which functions within the framework of the *Mission d'aménagement du Sénégal*, is in charge of collecting and disseminating information on weaver bird, control of weaver bird, maintenance of control equipment, and research for the development of new control methods.

The Decree of 19 November 1955 provides for the establishment of a Bird Control Section in the French Sudan within the local Plant Protection Division, in charge of collecting information on all birds that damage crops and of organizing bird control in the territory.

The General Decree of 14 October 1955 authorizes the Chief of Plant Protection in French West Africa to co-ordinate the control of harmful grain-eating birds in the territories of the Federation.

The results of these efforts have been encouraging. It is estimated that in 1954, 1955 and 1956, over 500 million birds were killed in the Senegal Valley alone by burning and explosives. However, the species is far from being eradicated.

During 1958, because of reduced control operations, the *Quelea* increased and became a threat once again.

In the Sudan and Niger the situation is equally serious and control needs to be carried out conclusively. It must, however, be recognized that killing birds by fire and explosives is rather obsolete. For complete protection of crops, the application of poisons by airplane and helicopter is the only method which is rapid, economical, and which can ensure eradication over large areas.

Stegobium paniceum as a Pest of Stored Turmeric, in Rajasthan, India and its Control by Fumigation

B. K. Srivastava, Department of Zoology and Entomology
Rajasthan College of Agriculture, Udaipur

Turmeric (*Curcuma domestica*) is one of the important spices in India. The rhizomes are dried and sometimes stored for a number of years before reaching the consumer. Recently, a heavy and widespread infestation of this condiment by an anobiid beetle came to the notice of the writer. The beetle was identified as *Stegobium paniceum* (L.) from specimens reared in the laboratory. This insect is distributed throughout the world and has been said to "eat anything except cast iron." In India no attempt has been made to date to consider its biology and control. For protection in storage, 5 percent BHC dust is generally used. The present investigation was undertaken to study the biology of this insect in relation to turmeric as host and to develop control measures through fumigation, in order to replace the use of BHC, which involves a poison residue hazard.

Materials and methods

Uninfested dried turmeric rhizomes with moisture content of 6 percent were cut into pieces about 1/2 inch long and placed into 1-lb. jars to a thickness of 1 inch. Four pairs of newly hatched adults of *Stegobium paniceum* were introduced in each jar. In two and a half months all stages were present in ample numbers. The fumigation tests were conducted in 4-gallon tins with a capacity of 0.656 cubic foot each, and were replicated twice. The following fumigants and rates of application were used:

Carbon tetrachloride, at 10 lb. per 1,000 cubic feet

Ethylene dichloride-carbon tetrachloride mixture (75 % + 25 %), at 20 lb. per 1,000 cubic feet

Ethylene dibromide-carbon tetrachloride mixture (5 % + 95 %), at 8 lb. per 1,000 cubic feet

Ethylene dichloride, at 30 lb. per 1,000 cubic feet

Ethylene dibromide, at 3 lb. per 1,000 cubic feet

Fumigation was effected during August, at room temperature, with an exposure period of 24 hours. After fumigation the cultures were removed from the tins and allowed to air for 12 hours. The mortality of the insects in various stages was then recorded. For this purpose, the samples were sieved in a 35-mesh sieve to eliminate the pupae and the adults. The remainder was sieved further in a 60-mesh sieve to separate the eggs and the smaller larvae. While there was no difficulty in counting the adults and pupae, it was not possible to count all eggs and larvae in an entire treated culture because of their minute size and large numbers. The cultures were, therefore, divided in seven samples and the eggs and larvae in each were counted separately under a binocular microscope. The eggs and the pupae were reared further to record their viability.

Biological observation

The adult beetle of *Stegobium paniceum* is about 1/10 of an inch long, cylindrical, and uniformly light brown. The body is covered with fine silky pubescence. The larva is white and somewhat hairy. The eggs are laid among the turmeric pieces loosely. The tiny larvae emerging from the eggs tunnel through the turmeric. The heavily infested rhizomes become filled with frass. When the larvae become full-grown they

TABLE 1. Comparative effectiveness of different fumigants against the four stages of *Stegobium paniceum* infesting turmeric

Fumigant	Adults		Pupae		Larvae		Eggs	
	number	mortality percentage	number	mortality percentage	number	mortality percentage	number	mortality percentage
Carbon tetrachloride	251	100	12	33.3	78	87.2	39	51.3
Ethylene dichloride + Carbon tetrachloride	198	100	18	16.6	81	96.3	41	31.7
Ethylene dibromide + Carbon tetrachloride	120	100	52	55.8	77	97.4	19	78.9
Ethylene dichloride	270	100	21	4.8	69	52.2[a]	31	22.6
Ethylene dibromide	140	100	17	35.3	86	95.3	22	45.5
Control	217	nil	37	nil	100	nil	100	nil

[a] Mortality was 60.9 percent at the end of the third day of the test; no further reduction was observed in other treatments.

pupate in small parchment-like cocoons inside the tunnels. The entire life cycle is passed in about six weeks, during the rainy season. The adult beetles lived from one to three weeks under laboratory conditions, and during this period a single female laid from 40 to 60 eggs.

Fumigation tests

The relative effectiveness of the five fumigants tested is shown in Table 1. From the data presented it is evident that these fumigants provided complete control of the adults. Other stages were not affected in like manner by the different fumigants. The pupae were hardest to kill, followed by the eggs. The maximum kill of eggs and pupae was brought about by the ethylene dibromide-carbon tetrachloride mixture Among the immature stages, larvae were highly susceptible to all the fumigants except to ethylene dichloride. Although no experimental determinations were made of the relative susceptibility of the different larval instars, it was observed that only fully developed larvae survived fumigation. It was further noticed that ethylene dichloride was slow in killing larvae; death occurred up to 72 hours after exposure.

In comparing the relative effectiveness of the fumigants it was found that of those tested the ethylene dibromide-carbon tetrachloride mixture was the most toxic to all stages of *Stegobium paniceum*. Next in order were ethylene dibromide and carbon tetrachloride, followed by the ethylene dichloride-carbon tetrachloride mixture; ethylene dichloride alone was the least toxic.

Outbreaks and New Records

GUADALOUPE

Harold E. Box, Trinidad, West Indies

Diatraea impersonatella, *a Sugar Cane Borer New to the Lesser Antilles*[1]

In April, the writer received some specimens of *Diatraea* for identification from R. Bénard, Entomologist of the *Institut national de la recherche agronomique*, Petit Bourg, Guadaloupe. These comprised larvae found boring in the stalks of sugar cane and a wild grass, *Paspalum virgatum*, at La Retraite, with mounted adult moths reared from the same series. M. Bénard believed these to be distinct from *D. saccharalis* (F.), the common sugar cane moth borer of the West Indian region and the only member of the genus hitherto known to occur in Guadaloupe.

These specimens proved to be *Diatraea impersonatella* (Wlk.) (= *Crambus impersonatellus* Walker), a species not previously recorded in the West Indies except in Trinidad, where it is the dominant borer in sugar cane. *D. impersonatella* is known on the mainland of South America in Venezuela, the Guianas, Brazil and Peru (Iquitos), and doubtfully from Bolivia and Argentina, but only at two widely separated localities in Venezuela does it appear to be a pest of economic importance.[2] Its presence in Guadaloupe may be presumed to be due to accidental introduction, most likely from Trinidad some years ago.

It is to be noted that Simmonds[3] suspected more than one species of *Diatraea* to be present in Guadaloupe, for he states: "One curious fact was noticed. The variations in the markings of *D. saccharalis* larvae in both Guadaloupe and Martinique is far greater than has been observed elsewhere. Some appear to be indistinguishable from those of *D. impersonatella* in Trinidad. Others, Mr. Box considers very similar to *D. rosa* Heinr. However, reared through to adults these all proved to be *D. saccharalis*." The writer can confirm that the larvae from Guadaloupe sent for identification by Dr. Simmonds were all *saccharalis*, but those received from M. Bénard are *impersonatella*, as also were moths of both sexes included in the same series.

M. Bénard communicates the interesting information that *Diatraea impersonatella* is parasitized by *Metagonistylum minense* Tns., and probably also by *Lixophaga diatraeae* (Tns.), two Tachinids which have been established in Gudadaloupe for the control of *D. saccharalis* in sugar cane.

[1] The substance of this paper is being presented at the tenth Congress of the International Society of Sugar Cane Technologists, Honolulu, Hawaii, May 1959.

[2] Box, H. E. 1951. New species and records of *Diatraea* Guild. from Northern Venezuela (Lepid., Pyral.). *Bull. Ent. Res.* 42 : 379-398.

[3] Simmonds, F. J. 1953. Insect pests of sugar cane in the French Antilles. *Trop. Agr.* (Trinidad) 30 : 122-127.

News and Notes

FAO MEETING ON THE USE OF PESTICIDES IN AGRICULTURE

Following the recommendations of the Tenth Session of the European Commission on Agriculture, the Director-General of FAO convened a panel of experts to consider problems relating to the safe use of pesticides in agriculture. The panel, which consisted of seven experts in agricultural pesticides and toxicology, met in Rome from 6 to 13 April 1959. The major problems under review included: (1) the role of pesticides in agriculture; (2) hazards from the use of pesticides; (3) residues on or in food and feedstuff; (4) safe use of pesticides; and (5) legislative control aiming at minimizing risks due to the improper use of pesticides. The report of the panel will be shortly available for distribution to all FAO Member Governments.

Discussions on the more important problems may be briefly summarized as follows:

Safe use of pesticides. The roles of government authority, industry and consumers in the safe use of pesticides are regarded to be closely related, with perhaps the major responsibility lying with the authority. The government authority should be responsible in establishing conditions under which a pesticide is formulated,

packed, transported and marketed, and in ensuring that the products are made available to users only in an appropriate and suitable form of packing which is properly labelled and that the claim made on the label for efficacy and safety is accurate.

EFFECTS ON CROP FLAVOR AND QUALITY. Among the risks resulting from the use of pesticides, frequent reference is made to their effects on the flavor of foodstuffs and to a possible alteration of their composition and consequently of their nutritive value. As yet only relatively few pesticides are known to produce a change of flavor in foodstuffs. The panel was satisfied that the aspect on change of flavor is receiving adequate consideration by government services and by both the pesticide and food processing industries. With regard to a possible alteration in the composition and nutritive value of a crop, the panel was not aware of any authenticated evidence that pesticides can cause this effect. Nevertheless, it felt that this problem deserves attention.

EFFECTS ON BENEFICIAL INSECTS. With a knowledge of the habits of beneficial insects, such as honey bees, predators and parasites, the panel considered it possible to accomplish chemical control of injurious insects without significant damage to beneficial insects, if certain factors (e. g., proper timing, susceptibility of beneficial insects to the pesticides in use) are observed.

RESIDUE TOLERANCES. The panel recognized that a wide variety of approaches are possible to regulate the amount of pesticide residues that may remain in or on food. They range from (*a*) comprehensive legislation covering all stages in the use of pesticides and culminating in official tolerances; (*b*) legislation on, for example, a minimum interval between final application and harvest, either with or without tolerances; to (*c*) restrictions on the sale of highly toxic pesticides and the control of use by means of voluntary registration schemes and the publication of official recommendations based on unpublished "administrative" tolerances. There is a universally recognized need for legal measures to deal with the ill-principled or ignorant grower who, in failing to follow advice on the use of a pesticide, produces food containing harmful residues. However, the panel pointed out that caution is necessary in an approach to the matter of regulation and legislation, since an unrealistic attitude to the problem of controlling pesticide residue levels in food can, and has, resulted in some unnecessarily severe restrictions on plant and animal protection practices, leading to losses of food supplies.

It was felt that each government should evaluate its own situation to determine what policy of control is best suited to its requirements, including its ability to administer and to provide the technical services required by the chosen system.

CCTA/CSA MEETING ON CAPE ST. PAUL WILT OF COCONUTS

Cape St. Paul wilt was first recognized in Ghana in the early thirties and since then has killed a large number of mature coconuts in the Weh, Cape St. Paul and Tegbi areas. The symptoms include chlorosis and yellow or bronze discoloration of the leaves in the crown, and at the final stage of the disease the affected trees are killed. The disease occurs also in Nigeria, where it is known as Awka wilt. It is believed to be identical with the bronze leaf wilt of the Caribbean. A similar but less epidemic disease occurs in the Republic of Togo, the cause of which has not been determined.

Because of the seriousness of this disease, a technical meeting, in which experts of Ghana and Togo participated, was convened at Lomé, Togo, 24 March 1959, under the joint auspices of the Commission for Technical Co-operation in Africa South of the Sahara (CCTA) and the Scientific Council for Africa South of the Sahara (CSA). After having discussed the aspects of research which have already been accomplished, the meeting felt that the following factors may be provisionally discarded as the cause of the disease: effect of the nature, structure and fertility and pH of the soil, nutritional deficiency, age of the palms, and action of *Oryctes* and nematodes. It was recognized that both the water table and the occurrence of a hard pan could play a part under certain unknown conditions but the meeting considered it most probable that a virus transmitted by an insect vector or other agent is involved. The need for having a virologist and an entomologist to investigate this disease was emphasized and it was recommended that CCTA, in collaboration with FAO, make an effort to convene an international meeting on coconut diseases in Africa.

ROMA, 1959 — Tipografia del Senato del Dott. G. Bardi.

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